

## REPTILIA: TESTUDINES: TESTUDINIDAE

## GEOCHELONE CHILENSIS

## Catalogue of American Amphibians and Reptiles.

Ernst, C.H. 1998. *Geochelone chilensis*.

*Geochelone chilensis* (Gray)

## Chaco Tortoise

*Testudo* (*Gopher*) *chilensis* Gray 1870a:190. Type locality, "Chili [Chile, South America]." Restricted to Mendoza, Argentina by Boulenger (1889) without explanation (see Comments). Syntypes, Natural History Museum, London (BMNH), 1947.3.5.8–9, two stuffed juveniles; specimens missing as of August 1998 (*vide* C.J. McCarthy and C.H. Ernst, see Comments)(not examined by author).

*Testudo argentina* Sclater 1870:471. See Comments.

*Testudo chilensis*: Philippi 1872:68.

*Testudo* (*Pampatestudo*) *chilensis*: Lindholm 1929:285.

*Testudo* (*Chelonoidis*) *chilensis*: Williams 1950:22.

*Geochelone chilensis*: Williams 1960:10. First use of combination.

*Geochelone* (*Chelonoides*) *chilensis*: Auffenberg 1971:110.

*Geochelone donosobarrosi* Freiberg 1973:83. Type locality, "San Antonio [Oeste], Río Negro [Province, Argentina]." Holotype, U.S. Natl. Mus. (USNM) 192961, adult male, collected by S. Narosky, 22 April 1971 (examined by author).

*Geochelone petersi* Freiberg 1973:86. Type locality, "Kishka, La Banda, Santiago del Estero [Province, Argentina]." Holotype, USNM 192959, subadult male, collected by J.J. Marcos, 5 May 1971 (examined by author).

*Geochelone petersi*: Freiberg 1973:91. *Ex errore*.

*Geochelone* (*Chelonoidis*) *chilensis*: Auffenberg 1974:148.

*Geochelone chilensis chilensis*: Pritchard 1979:334.

*Geochelone chilensis donosobarrosi*: Pritchard 1979:335.

*Chelonoidis chilensis*: Bour 1980:546.

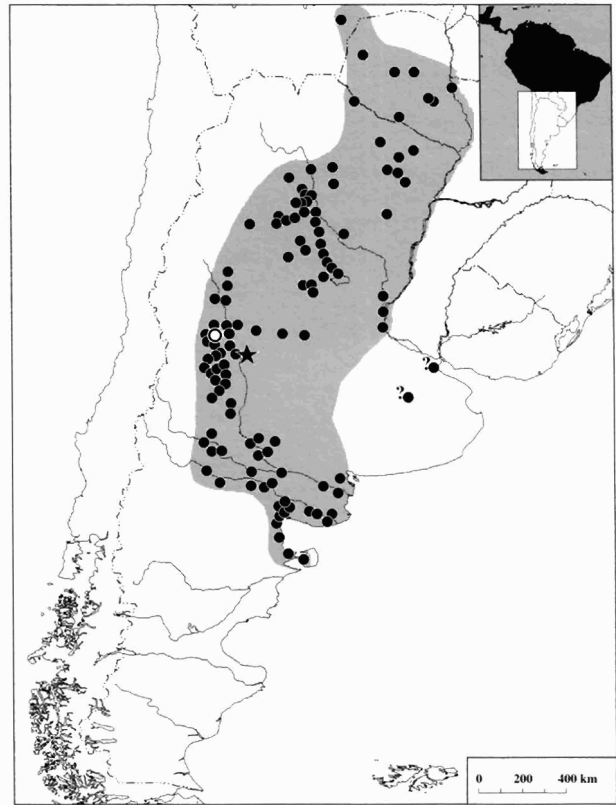
*Geocheloni petersi*: Freiberg 1984:30.

*Chelonoidis donosobarrosi*: Cej 1986:148.

*Chelonoidis petersi*: Cej 1986:148.

• **CONTENT.** No subspecies are recognized. See Comments.

• **DEFINITION.** Adults are 18.0–43.3 cm (greatest known length of male, 23.3 cm) in straight carapace length. The oval carapace is flattened dorsally with descending sides, a cervical indentation, and a serrated posterior marginal rim. The posterior marginals are slightly upturned, and no cervical scute is present. The first vertebral scute is usually broader than long or its width is at least equal to its length. Other vertebrals are broader than long, with the fifth laterally flared. Well-defined



**MAP.** The circle marks the type locality; dots indicate other selected records; stars indicate fossil records.

growth annuli surround the slightly raised vertebral and pleural areolae. Each side usually has 11 marginals. A single, undivided supracaudal scute which is downturned between the posterior marginals is present. The well-developed plastron has a deep anal notch. Its forelobe tapers toward the front, and the paired gulars may be slightly divided anteriorly by a notch. The forelobe is longer but slightly narrower than the hindlobe. The average plastral formula is:  $abd > hum > fem > gul > pect > an$ ; the paired gulars are thick and do not project much beyond the anterior rim of the carapace. The bridge is long with an axillary about half as large as the inguinal. The anterior surface of each foreleg is covered with large, angular scales which may or may not slightly overlap. Several enlarged tubercles occur on each thigh, and the tail ends in an enlarged scale. Like other



**FIGURE.** *Geochelone chilensis* (photographs by Jay C. Shaffer).

*Geochelone*, this species has 52 chromosomes (Bickham and Carr 1983).

The carapace may be either totally yellowish-brown or have dark-brown or black growth annuli surrounding tan areolae, and a dark wedge of pigment at the posterior seam of each marginal. Many Patagonian individuals have dark or dark-ringed areolae that contrast with the remainder of the carapacial scutes. The plastron varies from uniformly yellow-brown to having a dark triangular wedge along the seams of each scute. The head is moderate in size with a short snout and a hooked, bi- or tricuspid upper jaw. The large prefrontal scale is divided longitudinally and followed by a large frontal scale which may be either entire or subdivided; other head scales are small. Head, limbs, and tail are yellowish-brown.

The sexes are difficult to distinguish, but males are smaller and have slightly longer tails. Old males are slate gray with large heads and very enlarged, even columnar antebraichial scales; females and juveniles have apposed, pointed, antebraichial scales (Buskirk 1993). Only male forelimb scales darken and hypertrophy. The interhumeral seam of adult males is more than half the length of the interabdominal seam, that of females may be twice as long.

• **DESCRIPTIONS.** General descriptions are in Belmonte (1991), Boulenger (1889), Buskirk (1993), Cei (1986), Chebez (1994), Ernst and Barbour (1989), Freiberg (1938, 1971, 1973, 1974, 1981, 1984), Gray (1870c,d, 1872, 1873), G. Müller (1987), Müller and Hellmich (1936), Paull (1983), Pritchard (1967a, 1979), Siebenrock (1909, 1912), and Williams (1960). Other descriptions are as follows: **egg and hatchling** (Belmonte 1991), **skull** (Crumly 1982), **shell osteology** (Auffenberg 1971), **wrist and forehand bones** (Auffenberg 1966), **pancreas** (Serma de Esteban 1961), and **habitat** (Auffenberg and Iverson 1979, Richard and de la Fuente 1992a).

• **ILLUSTRATIONS.** Color illustrations of adults are in Bonin et al. (1996), Cei (1993), Freiberg (1981), G. Müller (1987), Pritchard (1967a, 1979), and Rogner (1996). Black and white photographs or drawings of adults or shells are in Auffenberg (1969), Belmonte (1991), Buskirk (1993), Chebez (1994), Crumly (1989), Ernst and Barbour (1989), Freiberg (1967, 1971, 1972, 1973, 1974, 1981, 1984), Müller and Hellmich (1936), Paull (1983), Rust (1938), Waller (1997), Waller and Micucci (1997), Wermuth and Mertens (1961), and Williams (1960). Hatchlings or juveniles were illustrated in black and white by Belmonte (1991), Buskirk (1993), and Freiberg (1971, 1972). Eggs were shown by Belmonte (1991) and Freiberg (1981). The skull was illustrated in Cei (1986). Bones and scales of the shell were illustrated by Cei (1986), Freiberg (1938, 1981), Siebenrock (1912), and Wermuth and Mertens (1961). Belmonte (1991) included a drawing of the foreleg, and Auffenberg (1966) presented a drawing of the wrist and forehand bones. Auffenberg (1969) showed the habitat. The burrow or pallet were illustrated by Auffenberg (1969) and Waller and Micucci (1997). Food plants were pictured by Waller and Micucci (1997). Charts illustrating commercial trade structure were presented by Waller (1997). Freiberg (1972) included photographs illustrating aggressive behavior and copulation.

• **DISTRIBUTION.** *Geochelone chilensis* occurs in southwestern Bolivia, western Paraguay, and northwestern Argentina southward to just beyond 40°S in northern Patagonia. Two colored slides of a *G. chilensis* in the collection of the Division of Amphibians and Reptiles, USNM, were photographed by Emmons (1993) at Curuyuqui, a small ranch about 140 km southeast of Santa Cruz city, Bolivia. These substantiate reports by Auffenberg (1974), Ernst and Barbour (1989), Groombridge

(1982), and Pacheco and Aparicio (1996) for which no specimens are available. Discussions of distribution are in Cei and Castro (1978), Chebez (1994), Laurent and Teran (1981), Lavilla and Sirocchi (1991), Ormeño (1983), Orrego Arevena (1971, 1979), Paull (1983), Richard (1990a, 1990b), Richard et al. (1990), and Scott and Lovett (1975). Distribution maps are in Auffenberg (1969), Buskirk (1993), Cei (1986, 1993), Iverson (1986, 1992), Pacheco and Aparicio (1996), Paull (1983), Richard and de la Fuente (1992b), Walker (1989), Waller (1997), and Waller and Micucci (1997). Bonin et al. (1996), presumably by mistake, included a small portion of Brazil.

• **FOSSIL RECORD.** Auffenberg (1971) reported that the Miocene species *Geochelone gringorum* (= *Testudo gringorum* Simpson 1942) from the Chubut Valley of Patagonian Argentina is closely related to *G. chilensis*. He based this on its depressed carapace, which has a round outline when viewed from above, its slightly bifurcated epiplastron, and its proportionately long anal scute. Because its holotype (American Museum of Natural History 3366) can only be separated from *G. chilensis* by its thicker xiphiplastron, Auffenberg (1971) thought *gringorum* ancestral to *chilensis*. He also reported that a group of Plio-Pleistocene tortoise fossils from western Argentina bridge the temporal and minor morphological gaps between the Miocene *G. gringorum* and extant *G. chilensis*, and later Auffenberg (1974) referred to these fossils as *G. chilensis*. De la Fuente and Cabrera (1988) reported fossil remains from the Sierra Chica, Cordoba Province, Argentina, and Alderton (1988) reported Pleistocene fossils.

• **PERTINENT LITERATURE.** General accounts are in Alderton (1988), Auffenberg (1969), Bonin et al. (1996), Brüner (1953), Cei (1986, 1993), Chebez (1994), Ernst and Barbour (1989), Fernández (1983), Ferrari (1983), Freiberg (1954, 1967, 1971, 1972, 1974, 1981, 1984), Gallardo (1974, 1977), Groombridge (1982), Gruss and Waller (1986), Krieg (1951), G. Müller (1987), N. Müller (1987), Orrego Aravena (1971), Pacheco and Aparicio (1996), Philippi (1872), Pritchard (1967a, 1979), Rogner (1996), Rottman (1969), Rust (1938), Walker (1989), Waller et al. (1989), and Wermuth (1967). Other papers are listed by topic as follows: **evolution and relationships** (Bour 1985; Coto Rojas and Acuña Mesén 1986; Crumly 1982; Marlow and Patton 1981; Williams 1950, 1952, 1960), **taxonomy** (Buskirk 1993; Crumly 1988; David 1994; Gray 1870b, 1871, 1873; Mertens and Wermuth 1955; Müller and Hellmich 1936; Pritchard 1979; Pritchard and Trebbau 1984; Sclater 1870; Wermuth and Mertens 1961, 1977), **rostral pores** (Winokur and Legler 1974), **mental glands** (Winokur and Legler 1975), **brain chemistry** (Juorio 1969), **olfaction** (Trapani et al. 1977), **adrenal gland** (Jones 1957), **clitoris** (Obst 1986), **pancreas** (Serma de Esteban 1961), **blood** (Rabito et al. 1972; Troiano and Vautier 1986), **renin-angiotensin system** (Nolly and Fasciolo 1972), **life history** (Wilbur and Morin 1988), **reproduction** (Buskirk 1993, Paull 1983), **courtship** (Buskirk 1993, Fernández and Basso 1992), **vocalizations** (Fernández and Basso 1992), **nesting** (Auffenberg 1969, Buskirk 1993, Piacentini 1986), **eggs** (Auffenberg 1969, Buskirk 1993, Ewert 1979, Iverson et al. 1993, Moll 1979, Monteverde 1968), **ecology** (Richard and de la Fuente 1992a, Waller and Micucci 1997), **habitat** (Auffenberg and Iverson 1979, Buskirk 1993, Chebez 1994, Waller 1986b), **population dynamics** (Richard and de la Fuente 1992a, Waller and Micucci 1997), **biomass** (Iverson 1982), **sex ratio** (Auffenberg and Iverson 1979, Richard and de la Fuente 1992a), **hibernation** (Auffenberg and Iverson 1979, Buskirk 1993, Dünnebie 1967), **water relations** (Obst 1986, Richard et al. 1988), **nocturnal activity** (Richard et al. 1988), **burrows** (Buskirk 1993, Belmonte 1991, Waller and Micucci 1997), **diet**

(Paull 1983; Richard 1988d, 1994; Waller and Micucci 1997), **soil ingestion** (Richard 1988d), **human influence** (Richard 1988a, 1988b, 1988c), **competition from domestic animals** (Buskirk 1993, Waller and Micucci 1997), **status and management** (Freiberg 1974; Groombridge 1982; Waller 1986a, 1986b, 1987), **husbandry** (Allen 1994, Belmonte 1991, Boscarol 1992, Bringsoe 1988, Gruss 1986, G. Müller 1987), **commercial trade** (Buskirk 1993, Waller 1997), **parasites and disease** (Buskirk 1993; Estrada-Peña et al. 1993; Jacobson et al. 1985; Richard and Guglielmo 1988a, 1988b; Wright 1992); **scute abnormalities** (Richard 1987, Richard and de la Fuente 1992a), and **common and vernacular names** (Barran and Freiberg 1951, Iverson 1985, Mittermeier et al. 1980, Pritchard 1967b).

• **ETYMOLOGY.** The name *chilensis* refers to Chile, the mistakenly presumed collection site of the syntypes (see Comments).

• **COMMENTS.** Gray (1870a) reported two syntypes of *Geochelone chilensis* from "Chili [Chile]" and stated that "There are at present living in the Society's [Zoological Society of London] Gardens two species of Land-Tortoises ... which Mr. Bartlett assures me came direct from Chile." Sclater (1870) noted that the specimens were probably not Chilean; further he proposed an Argentinian origin, possibly from the Pampas near Mendoza in western Argentina. Gray (1871) took exception with Sclater's locality change, referring to the original data obtained from Sclater's assistant "Mr. Bartlett." Gray suggested that the tortoises "were obtained near Santiago on the Coast of Chili." Boulenger (1889), without explanation but possibly referring to the locality data mentioned by Sclater (1870), designated "Mendoza," Argentina as the locality of the two syntypes in the BMNH, and this designation has been followed since.

That a tortoise occurred in Argentina before Gray (1870a) described *Geochelone chilensis* was known. d'Orbigny (1835) and Burmeister (1861) both mentioned a tortoise in their faunal accounts, and d'Orbigny (1835) and Duméril and Bibron (1835) mistakenly referred it to the African species *Testudo sulcata* Miller 1779 (= *Geochelone sulcata*), which it resembles. Strauch (1862) discussed the presumed exceptionally disjunct range of *T. sulcata* and suggested that the South American tortoise was probably a different species. Gray (1870a) was the first to assign a distinct species name to the Argentinian tortoise. Sclater (1870) proposed an invalid replacement, *Testudo argentina*, owing to his view that Gray's type locality was incorrect.

Freiberg (1973) described *Geochelone donosobarrosi* and *G. petersi* as new species of tortoises from Argentina, and Pritchard (1979) relegated them to subspecies of *G. chilensis*. Buskirk (1993) could not differentiate either of these forms from *G. chilensis* based on a detailed morphometric and meristic study, and relegated both names to the synonymy of *G. chilensis*.

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